

US Patent Application: 10/573,021

IN THE CLAIMS:

Please cancel claims 45-85 without prejudice or disclaimer.
Please add all new claims 86-111.

86. (New) An **impact driver** for driving an **elongate object** into a **body** in any plane from the horizontal to the vertical, said **impact driver** comprising

- a) **chassis**,
- b) a **ram** supported by said **chassis** in a manner allowing rectilinear movement of said **ram** relative to said **chassis**,
- c) a **linear induction motor** including
 - (i) a **stator** mounted to said **chassis**, and
 - (ii) a **linear induction motor reaction member** composed of at least one plate of an electrically conductive material mounted to said **ram**,
 - (iii) the **stator** being positioned to operatively interact with **linear induction motor reaction member** to accelerate the **reaction member** substantially along a length of movement of the **reaction member** to move the **reaction member**
 - from a **retracted position** to an **impact position**, and
 - from the **impact position** to the **retracted position**,
- d) whereby, when the said **reaction member** is accelerated to move from said **retracted position** to said **impact position**, the **ram** is accelerated at an increasing rate throughout its movement by the **reaction member** to substantially increase its kinetic energy for causing an impact force to be imparted on said **elongate object** in the **elongate direction** thereof.

87. (New) The **impact driver** as claimed in claim 86, wherein said **ram** includes an **impact head** for receiving said **impact force** from the **ram** and transmitting it to an **elongate object**.

88. (New) The **impact driver** as claimed in claim 87, wherein said **ram** includes an **elongate ram support structure**, said **ram support structure** having a **first** and **second ends**, and wherein said **impact head** is provided at a **first end** of said **ram support structure**.

89. (New) The **impact driver** as claimed in claim 88, wherein said **reaction member** is of an **elongate configuration**, and is secured to the **ram support structure** to extend in the **elongate direction** of said **ram support structure** between said **first** and **second ends** thereof.

90. (New) The **impact driver** as claimed in claim 87, wherein said **impact head** is of a **robust** and **substantially solid** material suitable for the transferal of an **impact** from the **ram** to the **elongate object**.

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91. (New) The **impact driver** as claimed in claim 86, wherein said **chassis** provides **bearings** which locate and support said **ram** for rectilinear movement within said **chassis**.
92. (New) The **impact driver** as claimed in claim 91, wherein said **bearings** are located within a **casing** of said **chassis**, said **ram** also at least in part provided and retained by said **bearings** within said **casing** of said **chassis**.
93. (New) The **impact driver** as claimed in claim 91, wherein said **stator** of said **linear induction motor** is positioned within the **casing** of said **chassis**.
94. (New) The **impact driver** as claimed in claim 86, wherein said **chassis** includes a **casing** defining an elongate chamber within which at least part of said **ram** is able to move in the elongate direction.
95. (New) The **impact driver** as claimed in claim 86, wherein the relative position of said **ram** at least when in one position with respect to said **chassis** is able to be sensed by an **electronic sensor**.
96. (New) The **impact driver** as claimed in claim 95, wherein said **electronic sensor** is a limit sensor for detecting the reaching of the **ram** to or proximate to its **retracted position**.
97. (New) The **impact driver** as claimed in claim 95, wherein said **electronic sensor** is in communication with a controller for controlling of the **linear induction motor**, in order for the **electronic sensor** to actuate the controller to accelerate the said **ram** from the **retracted position** to the **impact position**.
98. (New) The **impact driver** as claimed in claim 86, wherein said **stator** is controlled to accelerate the **ram** from the **retracted position** to the **impact position** at a rate different and most usually greater than from the **impact position** to the **retracted position**.
99. (New) The **impact driver** as claimed in claim 86, wherein an **anvil assembly** is positioned relative to said **chassis** to hold an **anvil** in alignment to the rectilinear direction of movement of said **ram** to be interposed between the head of said **elongate object** and said **impact head** for the purpose of providing a cushioning to the impact force of said **ram** applied to said **elongate object**.
100. (New) The **impact driver** as claimed in claim 99, wherein said **anvil assembly** is in a translatable engagement with said **chassis**.
101. (New) The **impact driver** as claimed in claim 99, wherein said **anvil assembly** presents said **anvil** at a location remote from said **chassis**.

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102. (New) The **impact driver** as claimed in claim 86, wherein said **chassis** is mounted to a **support structure**.
103. (New) The **impact driver** as claimed in claim 99, wherein said **chassis** is mounted to a **support structure** and said **anvil assembly** is in a translatable engagement with said **support structure** to permit its movement relative thereto and parallel to the rectilinear direction of movement.
104. (New) The **impact driver** as claimed in claim 86, wherein said **support structure** includes a **mounting arrangement** for mounting the **chassis** to a **vehicle**.
105. (New) The **impact driver** as claimed in claim 104, wherein said **mounting arrangement** allows said **support structure** to rotate relative to said **vehicle**.
106. (New) The **impact driver** as claimed in claim 104, wherein said **mounting arrangement** allows said **support structure** to translate relative to said **vehicle**.
107. (New) The **impact driver** as claimed in claim 86, wherein said **chassis** is mounted to a **support device** selected from one of a **vehicle**, a **vessel** and a **derrick**.
108. (New) The **impact driver** as claimed in claim 107, wherein said **chassis** is connected to the **support device** by an articulated mounting arrangement configured for mounting the **chassis** to the **support device** in an articulated manner.
109. (New) The **impact driver** as claimed in claim 86, wherein the **impact driver** is a **pile driver**.
110. (New) The **impact driver** as claimed in claim 86, wherein when said **reaction member** is accelerated to move from said **retracted position** to said **impact position**, the acceleration of the said **ram** is enhanced by the addition of a gravitational force component that increases from zero in the horizontal plane to a maximum additional acceleration of 9.81m/s^2 in the vertical plane.
111. (New) The **impact driver** as claimed in claim 86, wherein said **elongate object** can be extracted from said **body** by nature of the following arrangement:
 - a) said **impact position** and said **retracted position** are reversed with respect to said **elongate object** so that the said **ram** is accelerated away from said **elongate object**,
 - b) said **ram** includes an engagement arrangement for engaging with said **elongate object** to transmit forces from the **linear induction motor** to the **elongate object**, thereby to extract the **elongate object**; and
 - c) the movement of said **ram** being controllable through said **linear induction motor** to reduce said **ram**'s impact on said **elongate object** to a lesser extent when said **ram** returns to a more proximate position to said **elongate object** between extraction strokes.